CONTINUING EDUCATION PRESENTATION



FROM RESTORATION TO INNOVATION

Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products

FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products

AGENDA: WHAT ARE WE LOOKING AT TODAY?

- Intro to Cascadia
- Lessons Learned
- Project Examples
- Questions

ONTINUING EDUCATION PRESENTATION

INTRO TO CASCADIA WINDOWS & DOORS

FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products

FIBERGLASS INNOVATION



Our mission is to lead North America's transition to energy efficient and durable building design.

COMMERCIAL & MULTI-FAMILY Windows & Window Wall Storefront Glazing

INSTITUTIONAL Fixed & Operable Windows Swing & Sliding Doors assive House Windows & Doors **THERMAL SPACER** Exterior Cladding Assemblies Low-sloped Roofs & Soffits

UNIVERSAL SERIES™









ARCHITIZER A+ AWARD (2024)

INNOVATION & AESTHETICS Passive House International (China, 2019)

CAGBC GREEN BUILDING PRODUCT OF THE YEAR (2018)

MOST INNOVATIVE PRODUCT: CRYSTAL ACHIEVEMENT AWARD Window & Door Magazine (2017)

GLOBE ENVIRONMENTAL EXCELLENCE

TECHNOLOGY INNOVATION & APPLICATION (2013)

BC EXPORT AWARD (2012)

LESSONS LEARNED

CONTINUING EDUCATION PRESENTATION

LESSONS LEARNED

FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products

FOUR MAJOR LESSONS LEARNED



PRODUCT IMPACTS

Integrating environmental impacts of products into design process



CONTINUING EDUCATION PRESENTATION





5,100 Vancouver-area condos leak, poll finds

Based on average repair cost of \$7,150 per unit this would put the total cost at more than \$36 million, according to figure provided by Canada Mortgage and Housing Corp.

WYNG CHOW SUN BUSINESS REPORTER An estimated 5,100 condo-

miniums in Greater Vancouver have unrepaired leaks, an independent survey released Tuesday suggests.

Based on average repair cost of \$7,150 per unit - a figure provided by Canada Mortgage and Housing Corp. - this would put total repair costs at more than \$36 million.

Real estate consultant Frank Schliewinsky said water penetration in West Coast condos has become such a contentious issue that some people are comparing it to the great Manitoba flood of last year. Estimates of the total damage

caused by leaky condos range from \$100,000 up to \$1 billion for the entire province.

"A billion dollars would more than cover a total buyback of all 5,100 condos," Schliewinsky said in an interview.

"Everyone's got an opinion on who to blame and how much it's going to cost to fix. But given how many numbers are bandied about, it's apparent that nobody knows how big or extensive the problem really is. If it's do-able, let's fix it."

The survey of 2,200 new condo or townhome owners, conducted in 1996 by Schliewinsky's firm, Strategic Development Services Ltd., also suggested the degree to which leaks were not properly repaired vary by unit price, pro-

average of \$194,000.

ect type and market area:

Condos with unresolved wa- satisfactorily repaired within ter problems had been pur- the first 10 to 22 months of oc- owners report unsatisfactorily chased at an average of \$164,000, while problem-free units cost an

About 6.5 per cent of 877 survey respondents, or 57 people, 1,500 projects totalling 83,370 complained their leaks were not units have been put on sale.

cupancy. Vancouver's condo market condos.

shows that since 1989, more than

Assuming 6.5 per cent of repaired leaks, this would sug-Strategics' data base of Greater gest the existence of 5,100 leaky

The survey, gauging buyer

SEE CONDOS, DIS

Source: Strategic Development Services Ltd.

LEAKY CONDO CRISIS

FROM RESTORATION TO INNOVATION:



Owners of leaky condos plead for compensation



As the Barrett commission begins its probe into condo building practices, homeowners told of a heavy financial and emotional toll.

family on to welfare and precipitated illnesses in her children. One after another - some she said. brandishing corroded pipes, oth-

"We felt we were taken for a ride," she lamented. A placard ers placards — irate homeown- ride," she lamented. A placard ers pleaded Tuesday for com- leaning beside her stated: pensation for their leaky condo- "Leaky condo owners are cash cows."

> SEE COMMISSION, A2 VAUGHN PALMER, AI6

practices began its first day of hearings in a Vancouver hotel PT ballroom, angry protesters picketed outside looking for relief from an estimated \$1 billion in bills, a staggering toll in emo-tional turmoil and as-yet-uncal-culated health costs. B.C.'s top "The banks must love the rise .

in personal loans," read one 100 creator sign.

IAN MULGREW VANCOUVER SUN

As the provincial Barrett com-

The commission was appointed earlier this month after The booming industry now growing complaints from consumers, industry organizations and trade unions about problems plaguing the provincial housing market that have affected tens of thousands of people. Inside, people pounded the dustry created about 11,000 jobs presenter's podium and poured in British Columbia last year, out their hearts to commission- adding new jobs three times er Dave Barrett, former New faster than any other sector of Democratic Party premier, and the provincial economy, accord-

toria lawyer Peter Leask. "I was humiliated having to go on welfare," said a teary-eyed opportunities than ever in Georgia Doerksen, an infant cra- tourism-related industries such dled in her arms.

Her Burnaby condo turned out to be so badly built the fami-to couldn't sell it even at a sub-to couldn't sell it even at a sub-

employs 235,000 people, up about 11,000 over last year.

ALAN DANIELS SUN TOURISM REPORTER

The burgeoning tourism inhis two advisers, Vancouver ing to figures expected to be re-economist Robyn Allan and Vic-leased today by Tourism Minister Ian Waddell.

Officials say there are more as trafisportation, accommoda-

LEAKY CONDO CRISIS



"Anyone walking past this office tower at West Broadway can see the scaffolding erected to repair a wall that sheared off and fell to the street."

– Vancouver Sun, December 2001



LEAKY Condo Crisis

EIFS – Exterior Insulation Finish System "Cladding"

News Page A2 . The Review Saturday, October 25, 1997 A billion-dollar nightmare Fixing failed condos could cost \$1 billion indicated that walls Martin van den Hemel without rainscreens (a staff reporter drainage cavity inside a wall that allows for penetrating water to exit a t's an estimated bilwall) will not hold up to lion-dollar problem that scientists warned the Lower Mainland's wet weather. Not only of more than a are these walls flawed. First in a three-part series decade ago. they are destined to fail, Canada Mortgage and Housing Corporation's he says. Jim White says. But most of the failed three-storey wood-frame researchers knew the use condos, which are rotof wall designs common ting, have no rainscreens inside most failing con-You can't admit you were wrong then by in their walls, he says. dominiums on the West * . ** · · ·

CONTINUING EDUCATION PRESENTATION

LESSONS LEARNED: ENVELOPES MATTER

ESTIMATED COST \$3 BILLION – \$5 BILLION TO BC ECONOMY

HOMEOWNER PROTECTION ACT FROM 1998 TO 2009



THE LEAKY CONDO CRISIS OUTCOMES





FOUR MAJOR LESSONS LEARNED



Shifting building envelope approaches to be more comprehensive

TARGETING NET ZERO

Bringing performance requirements to the forefront

LIFECYCLE COSTS

Maximizing product durability to reduce lifecycle costs and building resiliency

PRODUCT IMPACTS

Integrating environmental impacts of products into design process

NOW WE HAVE A MUCH BIGGER PROBLEM...

The buildings that we have designed and constructed are *unnecessarily* a major contributor to excessive energy consumption and related climate change.



EXCESSIVE HEAT LOSS FROM BUILDINGS



CLIMATE CHANGE



BUILDINGS ARE RESPONSIBLE FOR 44.5% OF US CO₂ EMISSIONS.

HOW BUILDINGS ARE CONNECTED TO CLIMATE CHANGE...

Residential and commercial buildings account for almost 40 percent of total U.S. and Canadian energy consumption.



LESSONS LEARNED: TARGETING NET ZERO

WHY ARE OUR BUILDINGS CONSUMING SO MUCH ENERGY?

WHAT 'R' THE VALUES?











WHAT ARE THE LARGEST CONTRIBUTORS TO HEAT LOSS?

POOR WINDOW PERFORMANCE

POOR WALL PERFORMANCE

THERMAL PERFORMANCE

30-50%

of a building's heating & cooling energy is lost through windows

BY IMPROVING THE FRAME, YOU IMPROVE THE OVERALL PERFORMANCE OF THE ENTIRE WINDOW

Broeckx-Smith, S., Suh, S., 2019



FOUR MAJOR LESSONS LEARNED



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FRAME TYPES - LIFESPAN



FIBERGLASS

PHOTO CREDIT: NEUFFER WINDOWS

PHOTO CREDIT: EUROLINE WINDOWS

PHOTO CREDIT: GLO EUROPEAN WINDOWS

PHOTO CREDIT: CASCADIA WINDOWS & DOORS



CONTINUING EDUCATION PRESENTATION

FRAME TYPES - LIFESPAN



FRAME TYPES - LIFESPAN





FOUR MAJOR LESSONS LEARNED



PRODUCT IMPACTS

Integrating environmental impacts of products into design process



LIFECYCLE ENERGY COMPARISON - PRODUCTION



CONTINUING EDUCATION PRESENTATION

TIMES THEY ARE A'CHANGING







ARCHITECTURE 2030 CHALLENGE US FEDERAL BUY CLEAN INITIATIVE BUY CLEAN CALIFORNIA

FOUR MAJOR LESSONS LEARNED



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PROJECT EXAMPLES

REHABILITATION PROJECT EXAMPLES

FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance <u>building envelope products</u> CONTINUING EDUCATION PRESENTATION

MERIDIAN COVE Vancouver, BC

ENGINEER/DESIGNER RDH BUILDING SCIENCE

CONTRACTOR HIGHRISE GLASS

OWNER STRATA



MERIDIAN COVE





Images courtesy of Cascadia Windows & Doors

MERIDIAN COVE

ENVELOPES MATTER CONTINUING EDUCATION PRESENTATION



Images courtesy of Cascadia Windows & Doors



TARGETING NET ZERO LIFECYCLE COSTS PRODUCT IMPACTS


THERMALLY BROKEN ALUMINUM FRAME



THERMALLY BROKEN ALUMINUM FRAME

FIBERGLASS FRAME



THERMALLY BROKEN ALUMINUM FRAME

FIBERGLASS FRAME

OVER 100% IMPROVEMENT

Reduced heat loss through window using actual NFRC certified U-values from window fabricators

VINYL WINDOW – INTERNAL STEEL REINFORCING









PASSIVE HOUSE CERTIFIED

R-7.1

TRIPLE GLAZED THREE LOW-E COATINGS - 270/180

OVER 250% IMPROVEMENT



MERIDIAN COVE







MERIDIAN COVE







MERIDIAN COVE





Hamilton, ON

ARCHITECT/DESIGNER ERA ARCHITECTS

CONTRACTOR/DEVELOPER PCL

STRUCTURAL ENGINEER ENTUITIVE

OWNER CITY HOUSING HAMILTON



Images courtesy of DoubleSpace Photography





Images courtesy of Samantha Craggs / ERA Architects





Images courtesy of ERA Architects





Images courtesy of ERA Architects







Images courtesy of Intuitive / ERA Architects





Images courtesy of DoubleSpace Photography



PROJECT EXAMPLES: NEW CONSTRUCTION

CONTINUING EDUCATION PRESENTATION

LESSONS APPLIED: NEW CONSTRUCTION



COAL **HARBOUR** PASSIVE HOUSE

Vancouver, BC









PROJECT EXAMPLES: NEW CONSTRUCTION

CONTINUING EDUCATION PRESENTATION

LESSONS APPLIED: PRODUCT INNOVATION







Images courtesy of Intuitive / ERA Architects





PRODUCT INNOVATION





FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products 57

Images courtesy of ERA Architects, Morrison Hershfield / Stantec



Images courtesy of DoubleSpace Photography / Codrin Talaba



PACIFIC PROMENADE Vancouver, BC

ENGINEER/DESIGNER SENSE ENGINEERING

CONTRACTOR DURASEAL

OWNER STRATA



CONTINUING EDUCATION PRESENTATION

PACIFIC PROMENADE





ENVELOPES MATTER

TARGETING NET ZERO

LIFECYCLE COSTS

PRODUCT Impacts

PACIFIC PROMENADE

CONTINUING EDUCATION PRESENTATION





CONTINUING EDUCATION PRESENTATION

PACIFIC PROMENADE

ONSITE WATER TESTS COMPLETED

PRODUCTS TESTED

PASSED

INSURANCE DISCOUNT OFFERED FOR EXTENSIVE WATER TESTING

FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products 60

≈20

PACIFIC PROMENADE





MANUFACTURING PROCESS





LONGEVITY & DURABILITY





POOR LONGEVITY & DURABILITY



66

PACIFIC PROMENADE – COST BREAKDOWN

\$150,000 AVERAGE 2-BEDROOM IN 1992

\$125,000 PER UNIT REHABILITATION COST

\$775,000 AVERAGE 2-BEDROOM IN 2023



PACIFIC PROMENADE





PACIFIC PROMENADE







CONTINUING EDUCATION PRESENTATION

PACIFIC PROMENADE





PACIFIC PROMENADE



PACIFIC POINT II Vancouver, BC

ENGINEER/DESIGNER RDH BUILDING SCIENCE

CONTRACTOR FIRSTSERVICE RESIDENTIAL

OWNER STRATA




ENVELOPES MATTER

TARGETING **NET ZERO**

LIFECYCLE COSTS

PRODUCT Impacts

CONTINUING EDUCATION PRESENTATION



Images courtesy of Cascadia Windows & Doors



FROM RESTORATION TO INNOVATION: Leveraging rehabilitation 'lessons learned' to drive adoption of high-performance building envelope products

2019 Building By-law 12511 X

On July 23, 2019, Vancouver City Council enacted the 2018 BC Building Code (BCBC) with Vancouver-specific additional requirements and revisions. These changes came into effect on November 1, 2019, with the release of the 2019 Vancouver Building By-law (VBBL).

Aspects of the 2019 VBBL can be incorporated in projects subject to the 2014 VBBL by following the details provided within the Vancouver Building By-law.









FIBERGLASS FRAME

THESE CODES ARE DIFFERENT

PREVIOUS ENERGY CODES



ONE ENERGY USE LIMIT

SEPARATE ASSEMBLY R-VALUES



NOW (BC ENERGY STEP CODE EXAMPLE)





































PROJECT EXAMPLES: NEW CONSTRUCTION

CONTINUING EDUCATION PRESENTATION

LESSONS APPLIED: NEW CONSTRUCTION



THE COURTENAY

West Vancouver, BC





THE COURTENAY





CONTINUING EDUCATION PRESENTATION



THE COURTENAY

FROM RESTORATION TO INNOVATION:





MACLEOD BUILDING

Vancouver, BC

ARCHITECT/DESIGNER TEEPLE ARCHITECTS + PROSCENIUM ARCHITECTURE

CONTRACTOR HEATHERBRAE BUILDERS

OWNER UNIVERSITY OF BRITISH COLUMBIA



Images courtesy of Proscenium Architecture + Interiors







LIFECYCLE COSTS





Images courtesy of Proscenium Architecture + Interiors / Teeples Architecture / ACI

MACLEOD BUILDING





Images courtesy of Proscenium Architecture + Interiors



MACLEOD BUILDING





Images courtesy of Proscenium Architecture + Interiors / Teeples Architecture / ACI





Images courtesy of Cascadia Windows & Doors



MACLEOD BUILDING











MACLEOD BUILDING





PROJECT EXAMPLES: NEW CONSTRUCTION

CONTINUING EDUCATION PRESENTATION

LESSONS APPLIED: NEW CONSTRUCTION



KHUPKHAHPAY'AY

Vancouver, BC



Images courtesy of Intelligent City / BC Indigenous Housing Society



KHUPKHAHPAY'AY





Images courtesy of Intelligent City

CONTINUING EDUCATION PRESENTATION

KHUPKHAHPAY'AY





Images courtesy of Intelligent City



FOUR MAJOR LESSONS LEARNED



Shifting building envelope approaches to be more comprehensive

TARGETING NET ZERO

Bringing performance requirements to the forefront

LIFECYCLE COSTS

Maximizing product durability to reduce lifecycle costs and building resiliency

PRODUCT IMPACTS

Integrating environmental impacts of products into design process LESSONS LEARNED: PRODUCT IMPACTS

CONTINUING EDUCATION PRESENTATION

TOOLS USING EPD DATA













ENVIRONMENTAL PRODUCT DECLARATION (EPD) DATABASES



CALCULATING EMBODIED CARBON

Fiberglass vs. Aluminmum Glazing - SCALES OF ANALYSIS





Key assumptions:

Fiberglass data based on study: "Research on the impacts of Innovative Fenestration Materials on the Embodied and Operating Carbon of Buildings." PDF link: https://sustain.ubc.ca/sites/default/files/2022-018_Research%200n%20the%20impacts%200f%20Innovative%20Fenestration%20Materials_Zargar.pdf

Aluminum frame based on Kawneer Fixed & Ribbon Aluminum Windows EPD. This is in liue of comparing against Kawneer storefront product EPD ---this EPD better matched up with the window size and frame ratio from the Cascadia study - EPD link:

All-Timber Structure and Hybrid Timber Structure cases from KPFF study sent on 10/5. Athena LCA study, Cradle to Grave, structure only, includes biogenic carbon

Glazing comparisons are Cradle to Gate, A1-A3 only with no replacement cycles

Images courtesy - Confidential

CONTINUING EDUCATION PRESENTATION

NEW PCR FOR WINDOWS



NSF 1102-23

Product Category Rule for Environmental Product Declarations

PCR for Fenestration Assemblies



106

NEW PCR - DECLARED UNITS

Table 1 Modification of Table 4-3 from ANSI/NFRC 100-2020 to accommodate fenestration assembly types covered by this PCR

Product type	Opening (X) Non-operating (O)	Model size (width × height) SI (IP)
casement - single	x	600 mm × 1,500 mm (24 in × 59 in)
dual action	x	1,200 mm × 1,500 mm (47 in × 59 in)
fixed	0	1,200 mm × 1,500 mm (47 in × 59 in)
hinged escape	x	1,500 mm × 1,200 mm (59 in × 47 in)
horizontal slider	XO or XX	1,500 mm × 1,200 mm (59 in × 47 in)
JAL/jai awning	x	1,200 mm × 1,500 mm (47 in × 59 in)
pivoted	x	1,200 mm × 1,500 mm (47 in × 59 in)
projecting (awning – dual)	xx	1,500 mm × 1,200 mm (59 in × 47 in)
projecting (awning – single)	x	1,500 mm × 600 mm (59 in × 24 in)
door – sidelite	X or O	600 mm × 2,090 mm (24 in × 82 3/8 in)
skylight/roof window	x	1,200 mm × 1,200 mm (47 in × 47 in)
sliding patio door with frame	XO or XX	2,000 mm × 2,000 mm (79 in × 79 in)

Table 1 Modification of Table 4-3 from ANSI/NFRC 100-2020 to accommodate fenestration assembly types covered by this PCR

Product type	Opening (X) Non-operating (O)	Model size (width × height) SI (IP)	
curtain wall/window wall/ storefront/sloped glazing/ ribbon window	00	2,000 mm × 2,000 mm (79 in × 79 in)	
side-hinged exterior door	XO, or XX	1,920 mm × 2,090 mm (75 ¹ / ₂ in × 82 ³ / ₈ in)	
tropical awning	x	1,500 mm × 1,200 mm (59 in × 47 in)	
tubular daylight device	0	330 mm diameter (14 in diameter)	
vertical slider	XO or XX	1,200 mm × 1,500 mm (47 in × 59 in)	
NOTE — When two symbols are shown together, it should be understood as follows:			
XO = a portion of the product is opening, a portion of the product is non-operational XX = all portions of the product are non-operational			

🎎 Sustainable Minds

alazina system.

sacrificing glazing area.

ENVIRONMENTAL PRODUCT DECLARATIONS (EPD)



SO NOW WE CAN COMPARE US AGAINST OTHERS, RIGHT?

ACTUALLY, NO...


CONTINUING EDUCATION PRESENTATION

COMPARING EPD DATA





KEY TAKEAWAYS

KEY TAKEAWAYS

FROM RESTORATION TO INNOVATION: Leveraging 'lessons learned' to drive high-performance window product advancements

KEY TAKEAWAYS

WINDOWS HAVE HUGE IMPACT

Type | Location | Installation

Often the weakest link in a building's envelope, a little extra attention on windows can have large overall impact

LOOKING BACKWARDS TO LOOK FORWARDS

Lessons Learned Lead to Future Opportunities

Applying lessons learned to current restoration project can show us opportunities in new construction

HIGH-PERFORMANCE PRODUCTS = FLEXIBILITY

Line Items vs End Goal

Use a whole-building approach to highperformance to save costs and increase project flexibility. QUESTIONS

QUESTIONS?

CONTINUING EDUCATION PRESENTATION



FROM RESTORATION TO INNOVATION: Leveraging 'lessons learned' to drive high-performance window product advancements Ally